Science & Society

Endangered species need more help

The 15-year-old Endangered Species Act requires the Interior Department's Fish and Wildlife Service (FWS) and the Commerce Department's National Marine Fisheries Service (NMFS) to develop and implement specific plans to aid all U.S. species listed as "endangered" (facing imminent extinction) or "threatened" (likely to become endangered soon). However, two new reports indicate that federal programs aimed at recovering these species – returning them to a nonthreatened status – fall far short of what the law mandates.

According to a report issued Jan. 18 by the General Accounting Office (GAO), while it's not possible to save all species threatened with extinction, "biologists we interviewed suggested that recovery is possible for nearly 70 percent of the listed domestic species" – if appropriate recovery plans are enacted. However, as of May 1988, no recovery plans had been developed for 113 U.S. species – 26 percent of those listed at that time. Moreover, GAO found, even for the 271 species having recovery plans, completion of recovery activities – such as creating a captive breeding program, monitoring wild populations or buying critical habitat – averaged 6.5 years.

Although FWS has jurisdiction over 96.3 percent of the listed species, GAO found NMFS has the poorer track record. NMFS had no recovery plans for 61 percent of its listed species, compared with 40 percent of species covered by FWS. Moreover, NMFS has taken far longer to begin developing those plans – an average of 13.8 years, compared with 2.8 at FWS.

Officials of both agencies told GAO tight budgets were the primary reason they had not completed recovery programs for listed U.S. species. And a December analysis of FWS programs by the National Fish and Wildlife Foundation – an independent organization set up by Congress in 1984 – agrees that "the endangered species program is seriously underfunded and understaffed given the scope of its legally mandated duties." But one major reason for that, the foundation charges, is FWS' failure to let Congress – which sets its budget – know exactly how many species need "emergency" help.

And there are many. Roughly 4,600 species have been proposed for listing. FWS estimates about 1,000 of these will warrant immediate listing – and therefore protection. But under its current budget, FWS can list only about 60 species a year, the foundation notes, suggesting that even the most endangered may await federal protection for at least 16 years.

Funding doesn't explain the whole problem, however. When time and money are short, both agencies must adopt a triage approach for crisis management, GAO says. NMFS has no such system for identifying which species would benefit from the quickest attention or most money, although one is under development. While FWS does have such a system, GAO found the agency generally ignored most species highest on the priority list, concentrating instead on those with high "public appeal" or facing imminent recovery.

For example, in 1986 FWS directed 25 percent of all recovery funds not congressionally earmarked for specific species to just four animals – the American peregrine falcon, southern sea otter, gray wolf and Aleutian Canada goose. None of these is listed as endangered, GAO notes, or is even highly threatened throughout most of its range.

GAO recommends that in addition to making better use of a triage system for aiding listed species and periodically assessing whether species-recovery plans need changing, each agency should develop computerized files on the status of listed species. "[C]entralized information on the status of all listed domestic species would be beneficial," agrees Commerce Under Secretary William Evans, who says NMFS will consider developing such a file. FWS is now field-testing its own system to track a species' status.

Technology

Ivan Amato reports from Washington, D.C., at a meeting of the Transportation Research Board

Kynar and gentler streets

As gridlock grows, reliable traffic information becomes more valuable in helping drivers and traffic managers to make routing and signaling decisions. An unusual plastic film that generates electrical signals when run over by vehicles is well suited to gather such information, says Peter F. Radice, a research scientist with the Pennwalt Corp. in Valley Forge, Pa.

Materials that respond to mechanical stresses with a voltage difference across their bulk are said to be piezoelectric. The novel plastic, sold commercially as Kynar, is based on polyvinylidene fluoride (PVDF), a polymer made of repeating molecular units composed of a pair each of carbon, fluorine and hydrogen atoms. Normally PVDF has randomly winding molecular carbon chain-links and is not piezoelectric, but its formability and inertness make it useful in chemically harsh environments and for outdoor protective coatings.

To transform PVDF into Kynar piezo film, Pennwalt's chemical engineers first stretch the hot polymer as it pushes through a sheet-shaping device. This aligns the PVDF's carbon chains into parallel, zigzagging strips and planes. Next, the engineers deposit a metal coat such as their proprietary "silver ink" on each side of the stretched PVDF. Finally, they place the metal-polymer sandwich in a strong electric field. This makes the molecular units swivel so that their hydrogen atoms point in one direction and their electron-loving fluorine atoms point in another. The result is an electrically polarized polymeric film that generates a voltage difference across its faces when stretched or compressed. When traffic managers and researchers attach leads to the metallized areas, mechanical stress in the polymer results in small but easily measurable electrical currents with voltages proportional to the amount of stress.

Traffic-sensing devices made with Kynar would be useful for, among other things, counting vehicles, measuring speeds and weighing trucks in motion. More specifically, city transportation workers might use the data to ease their urban gridlock by changing the timing in traffic lights and thereby altering traffic flow. The devices – piezoelectric tape and cable – are either a strip or cable of metallized Kynar embedded in a roughly 2-inch-wide rubber belt that can stretch over one or more lanes depending on its length. Unlike existing multi-lane sensors, the Kynar devices can easily keep separate accounts on individual lanes. For permanent traffic monitoring, the sensors are placed in aluminum housings, which in turn can rest in grooves carved into road surfaces, Radice says.

Thumbs-sideways on smart cars and roads

Though already decades old, the movement toward "smart" cars and highways – in which human drivers are more like "passengers with voting rights" – is still in its infancy and consists largely of a technological wish list. That's the message from transportation researcher Steven E. Shladover of Systems Control Technology in Palo Alto, Calif. But he and others point out that in the wake of the ever-growing traffic congestion in our cities is a changing and more supportive political environment. Several demonstration projects, such as the "Smart Corridor" in Los Angeles and others in Tokyo and Berlin, are helping to build momentum. The ultimate vision, the researchers say, is a several-trillion-dollar system in which automatically controlled roads, vehicles and signals sense, communicate and respond to one another using a host of electronic and mechanical gadgets, telecommunications and computers. Safer roads that can carry more vehicles, goods and occupants to their destinations more rapidly and conveniently would be the payoff, the researchers predict. They agree, though, that the immensity of the project demands that they proceed with caution.